

V72/BAM102/EE/20160519

Time : 3 Hours

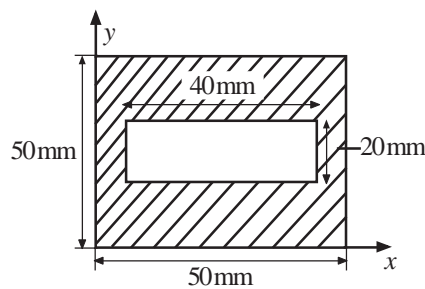
Marks : 80

Instructions :

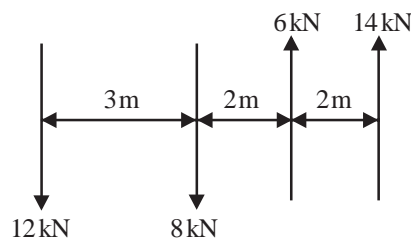
1. All Questions are Compulsory.
2. Each Sub-question carry 5 marks.
3. Each Sub-question should be answered between 75 to 100 words. Write every questions answer on separate page.
4. Question paper of 80 Marks, it will be converted in to your programme structure marks.

1. Solve any **four** sub-questions.

- a) State “Principle of transmissibility of force”. 5
- b) Find distance y so that the C.G. of given shaded area has coordinates (25, 20) mm. 5



- c) Determine the resultant of the parallel forces as shown. 5

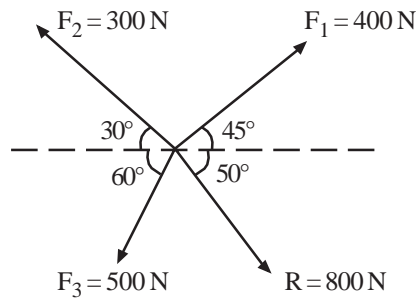


- d) A motorist travelling at a speed of 90 km/h suddenly applies the brakes and comes to rest after skidding 100 m. Determine the time required for the car to stop and coefficient of friction μ_k between the tyres and the road. 5
- e) Derive an expression for velocity in Simple Harmonic Motion. 5

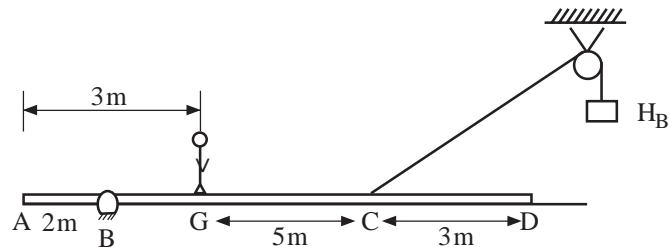
2. Solve any **four** sub-questions.

- a) Define the following terms: 5
Work of a force.

- b) $R = 800 \text{ N}$ is the resultant of four concurrent forces. Find the fourth force F_4 . 5



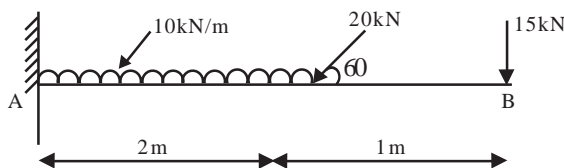
- c) A man of 800 N weight stands on a 10 m long uniform beam ABCD of self weight 2000 . The beam is supported by hinge at B and a rope whose one end is attached at C and the other end carries a counter weight W_B . Find the value of W_B needed to keep the beam in a horizontal position as shown and also the hinge reactions. 5



- d) The position vector of a particle which moves in x-y plane is given by $\vec{r} = (3t^3 - 4t^2)\mathbf{i} + (0.5t^3)\mathbf{j}$. Calculate velocity and acceleration at $t = 5 \text{ sec}$. 5
- e) Define the following terms : 5
- Conditions of equilibrium
 - Free Body Diagram

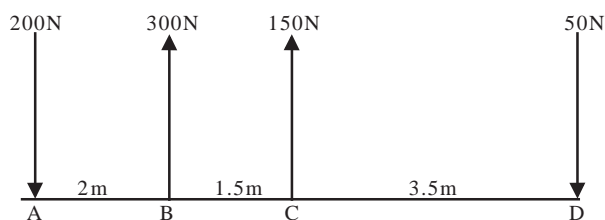
3. Solve any **four** sub-questions.

- a) Find the reactions. 5

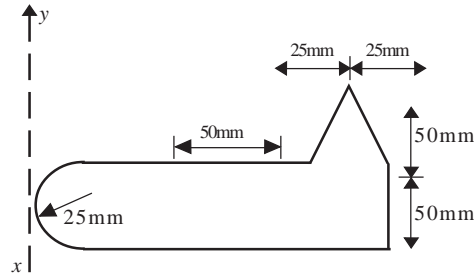


- b) Figure shows four parallel forces acting on a beam ABCD. 5

Determine moment from 'A' and 'B'.



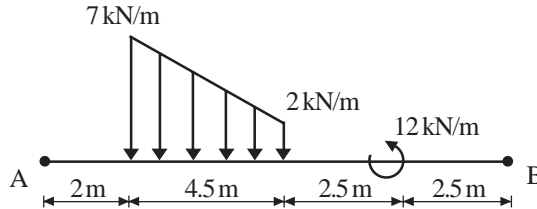
- c) A point is moving with uniform acceleration in the 11th and 15th second from the commencement it moves through 7.2 m and 9.6 m respectively. Find its initial velocity and the acceleration with it moves. 5
- d) Locate the centroid of the section. 5



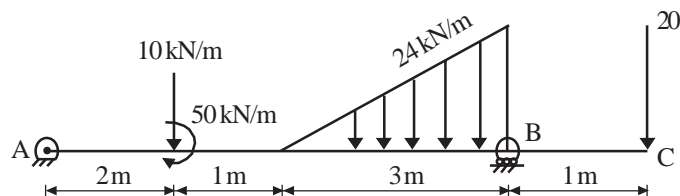
- e) Derive an expression for acceleration in Simple Harmonic Motion. 5

4. Solve any **four** sub-questions.

- a) Define the following: 5
- i) Axis of Symmetry (A.O.S.)
 - ii) Centre of gravity
 - iii) Centroid
- b) The beam AB is loaded by forces and couples as shown. Find the reaction force. 5



- c) Define : 5
- i) Oscillation
 - ii) Displacement
 - iii) Period
 - iv) Amplitude
 - v) Frequency.
- d) Find the reaction at B and A. 5



- e) State and prove Lam's theorem of three forces. 5

